SOME PLANKTONIC FORAMINIFERA FROM THE GULF OF MANNAR

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ABSTRACT

Seven species of planktonic foraminifera collected at a depth of 180 fathoms off Mandapam in the Gulf of Mannar are recorded for the first time from Indian waters. They are (1) *Orbulina bilobata* (d' Orbigny), (2) *Globigerina triloculinoides* Plummer, (3) *G. parava* Bolli, (4) *G. protolata* Bolli, (5) *Globorotalia pseudobulloides* (Plummer) (6) *Globorotalia pseudomenardii* Bolli and (7) *Globorotalia opima* Bolli. These are pelagic forms which are found to be abundent in the tropical warm waters at great depths. Details regarding the morphology and the distribution of the species have been given.

Studies of planktonic foraminifera in deep sea floor have been made by Stubbings (1939), Cushman and Henbest (1940) and Wiseman and Ovey (1950). Our knowledge on the planktonic foraminifera in Indian waters is very meagre although considerable work has been done on the systematics. The present paper records seven species of planktonic foraminifera for the first time from Indian waters. The material used in this study was collected at a depth of 180 fathoms off Mandapam, Gulf of Mannar.

A single species of *Orbulina,* three species of *Globigerina* and three species of *Globorotalia* are described here.

The difference between the genera *Globigerina* and *Globorotalia* lies in the position of the aperture. In *Globigerina* the aperture is interiomarginal, umbilical, whereas in *Globorotalia* it is interiomarginal, extraumbilical-umbilical. Chambers in *Globigerina* are globular and slightly compressed., in *Globorotalia* the chambers vary from globular to highly compressed.

Orbulina bilobata (d' Orbigny) (Fig. 1)

(Family Orbulinidae; Subfamily Orbuliniae; Genus *Orbulina* d' Orbigny, 1839)

Reference

Orbulina bilobata (d' Orbigny) Bermudez, 1949, Cushman Lab. Foram. Res., Spec. Publ. 25, p. 282, pl. 22, fig. 4; Bolli, H. M. 1957, U. S. Nat. Mus.

Bull. 215, p. 116, pl. 27, fig. 6; Postuma, J. A. 1971, Manual Planktonic Foram. p. 370.

Diagnosis

Test free, bilobata and five-chambered; the early chambers clearly visible and arranged trochospirally; chambers spherical, the penultimate chamber completely enveloping the globigerine coil; wall calcareous and perforate; primary aperture interiomarginal, umbilical in the early globigerine stage; numerous small openings scattered over much of the test wall.

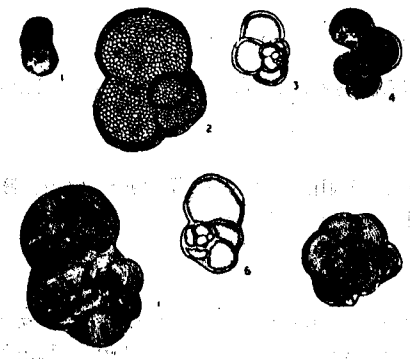

FIG. 1. *Orbulina bilobata* (d' Orbigny) X 60; 2. *Globigerina triloculinoides* Plummer X 100; 3. *G. parva* Bolli X 100; 4. *G. protolata* Bolli X 60; 5. *Globorotalia pseudobulloides* (Plummer) X 60; 6. *Globorotalia pseudomenardii* Bolli X 60; 7. *Globorotalia opima* Bolli X 60.

General distribution

North of Vienna, Austria, Trinidad, U.S.A.

Distribution in Indian region

This is the first record from the Indian region.

Globigerina triloculinoides Plummer (Fig. 1,2)

(Family Orbulinidae., Subfamily Globigerininae., Genus *Globigerina* d'Orbigny 1826)

Reference

Globigerina triloculinoides Plummer, 1926, Univ. Texas Bull. 2644, p. 134, pl. 8, figs. 10 a-c., Leoblich, A. R. and H. Tappan, 1957, U. S. Nat. Mus. Bull. 215, p. 183, pl. 43, figs. 5a - c & 8a - 9c., Postuma, J. A. 1971, Manual Planktonic Foram. p. 160.

Diagnosis

Test free, composed of rapidly enlarging chambers, arranged trochospirally., chambers subglobular, arranged in two whorls., the last whorl comprised of three chambers, with the final chamber occupying ½ the side., wall calcareous, coarsely perforate., sutures distinct, depressed., aperture interiomarginal, umbilical with a prominent lip.

General distribution

Denmark, Texas, Alabama, Maryland, New Jersey and Mexico.

Distribution in Indian region

Hitherto not recorded from the Indian region.

Globigerina parva Bolli (Fig. 1,3).

Reference

Globigerina parva Bolli, 1957, U.S. Nat. Mus. Bull. 215, p. 108, pl. 22 figs. 14a-c., p. 164, pl. 36, figs. 7a-c.

Diagnosis

Test small, strongly lobate, high spired form with 3½ to 4 chambers in the last whorl., wall calcareous, finely perforated., chambers spherical, 12 chambers arranged in 2½ whorls., sutures distinct and depressed., aperture a low interiomarginal, umbilicus small.

General distribution

Described as a new species from Trinidad, U. S. A.

Distribution in Indian region

Recorded for the first time from Indian region.

Globigerina prolata Bolli (Fig. 1,4).

Reference

Globigerina prolata Bolli, 1957, U. S. Nat. Mus. Bull. 215, p. 72, pl. 15, figs. 24-26.

Diagnosis

Test biconvex., periphery elongate, distinctly lobate., wall calcareous, twelve chambers arranged in 2½ whorls, the final whorl with 4 chambers, increasing rapidly in size., chambers globular, compressed, arranged trochospirally., sutures radial, depressed., aperture a distinct arch, interiomarginal, umbilical.

General distribution

Described as a new species from Trinidad, U. S. A.

Distribution in Indian region

This species has not been recorded so far from the Indian region.

Globorotalia pseudobulloides (Plummer) (Fig. 1.5)

(Family Globorotaliidae., Genus *Globorotalia* Cushman, 1927)

Reference

Globorotalia pseudobulloides Plummer, 1926, Univ. Texas Bull. 2644, p. 133, pl. 8, figs. 9a-c., Loeblich, A. R. and H. Tappan, 1957, U. S. Nat. Mus. Bull. 215, p. 192, pl. 45, figs. 1a-2c., Postuma, J. A. 1917, Manual Planktonic Foram. p. 202.

Diagnosis

Test free, very low trochospiral, compressed, chambers inflated and subglobular, arranged in 2½ whorls, increasing rapidly in size., 5 chambers in the last whorl., periphery distinctly lobulate., wall calcareous, finely punctate., sutures constricted., aperture interiomarginal, exteraumbilical-umbilical arch, bordered by a narrow lip.

General distribution

Denmark, Texas, Alabama, Maryland.

Distribution in Indian region

Recorded for the first ttime from Indian region.

Globorotalia pseudomenardii Bolli (Fig. 1.6)

Reference

Globorotalia pseudomenardii Bolli, 1957, U. S. Nat. Mus. Bull. 215, p. 193, pl. 60, figs. 8a-c., Postuma, J. A. 1971, Manual Planktonic Foram., p. 204.

Diagnosis

Test compressed, biconvex, trochospirally coiled., perphery with a distinct keel., chambers nearly equal height and breadth, arranged in 2½ whorls., the last whorl consisting of 5 chambers., the last chamber fairly large and hemispherical in shape., wall calcareous, finely perforate, surface smooth., sutures on spiral side strongly curved, on umbilical side radial and depressed., aperture interiomarginal, extraumbilical-umbilical with a distinct lip.

General distribution

Alabama, New Jersey, Mexico, Trinidad, U. S. A.

Distribution in Indian region

This is the first record from the Indian waters.

Globorotalia opima Bolli (Fig. 1.7)

Reference

Globorotalia opima Bolli, 1957, U. S. Nat. Mus. Bull. 215, p. 117, pl. 28, figs. 1a-2., Postuma, J. A. 1971, Manual Planktonic Foram. p. 344.

Diagnosis

Test very low trochospiral, equatorial periphery slightly lobulate., axial periphery rounded., Chambers spherical arranged in 2½ whorls., the last whorl consisting of 5½ chambers., wall calcareous, perforate., sutures radial depressed., aperture a low arch, interiomarginal, extraumbilical-umbilical.

General distribution

Trinidad, U. S. A.

Distribution in Indian region

Recorded for the first time from Indian seas.

Remarks

The planktonic foraminifera of the Gulf of Mannar are typical warm and tropical forms of the world and are represented by two families, viz., Orbulinidae and Globorotaliidae. All the seven species described here are recorded for the first time from Indian region. The common planktonic foraminifera which were known already from Indian waters are *Orbulina universa, Globigerina bulloides, G. calida, G. conglomerata, G. seminulina, G. cretacea, G. dubia, G. inflata, Globigerinoides ruber, Globigerinoides sacculifera, Globigerinoides conglobata, Globoquadrina dutertrei, Globorotalia menardii, Globorotalia tumida, Globorotalia canariensis, Globigerinella aequilateralis ,Sphaeroidinella dehiscens* and *Hastigerina pelagica.*

The distribution of planktonic species of foraminifera at different levels, known to be governed by temperature, is used to indicate any temperature changes in the waters.

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PROSPECTS OF MUSSEL CULTURE IN AN ESTUARINE ENVIRONMENT

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ABSTRACT

Successful spatfall in the Korttalaiyar eatuary at Ennore has been obtained and the mussel attained a length of about 80 mm during a period of 8 months. The shallowness of the estuary precludes the possibility of using the raft technique of culture. The 'bouchot' system, using stakes in the inter-tidal zone or the method of spreading the mussels on suitably prepared substratum for growth can be employed in the estuary. It is suggested that certain behaviour pattern of the spats observed in the laboratory could be utilised to secure attachment of the spats to the ropes used for culture, which will make mussel culture simpler and easier.

Mussel culture is the most important form of saltwater aquaculture and is unique among aquacultural practices as it produces a staple food rather than a luxury item (Bardach *et. al.*, 1972). Spain is the leading nation in mussel culture producing about 300,000 kg/ha of drained meat in a year. In India, Qasim and Achari (1972) have carried out preliminary experiments on mussel culture at Vizhinjam and obtained a yield of about 200 tons per hectare per year. Jones and Alagarswami (1973) have given a general picture of the mussel fishery resources of India. The potential resources for mussels are very high and with suitable methods of culture the production could be increased considerably (Qasim 1975).

There are about 2 million hectares of cultivable brackish water area in our country, (Jhingran *et. al.*, 1970) and they can be utilised to produce additional food resources. Most of the Indian estuaries are, fortunately, free from serious pollution and their sheltered water afford an ideal place for the cultre of crustaceans, fishes and molluscs.

However, the main draw back is that most of the rivers are seasonal and estuaries remain cut off from the sea for most part of the year by the formation